

Trouble in Paradise: Robbed and Wounded

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Jamal Brown,* a 17-year-old high school student from the Bronx, was on vacation in the Caribbean. He had been having a great time until one night, while walking alone on the beach, he was assaulted and robbed. This occurred so quickly that he isn't quite sure what happened. The next thing he can remember was waking up in a nearby rural hospital. According to one witness, Mr. Brown had lost consciousness for a few minutes.

Initial treatment. At the Caribbean urgent care facility, Mr. Brown was treated for what was thought to be only a superficial injury. A simple suture was placed in the laceration in his left temple and he was discharged. A few days later, Mr. Brown was back in the Bronx. He was worried about new onset horizontal diplopia and continuing head pain. His parents, meanwhile, noticed marked changes in his behavior. They told us he had become more aggressive and described episodes of foul language that seemed to come

“from out of nowhere.” Concerned, they brought him to the ER at Montefiore Medical Center.

We Get a Look

At Montefiore, the initial exam revealed a healthy, alert and oriented male with a left head turn. A 1-cm by 1-cm superficial wound in the left anterior temporal area without much ecchymosis or edema was noted (Fig. 1). His visual acuity was 20/20 bilaterally without correction and his pupils were equal, round and reactive to both light and accommodation.

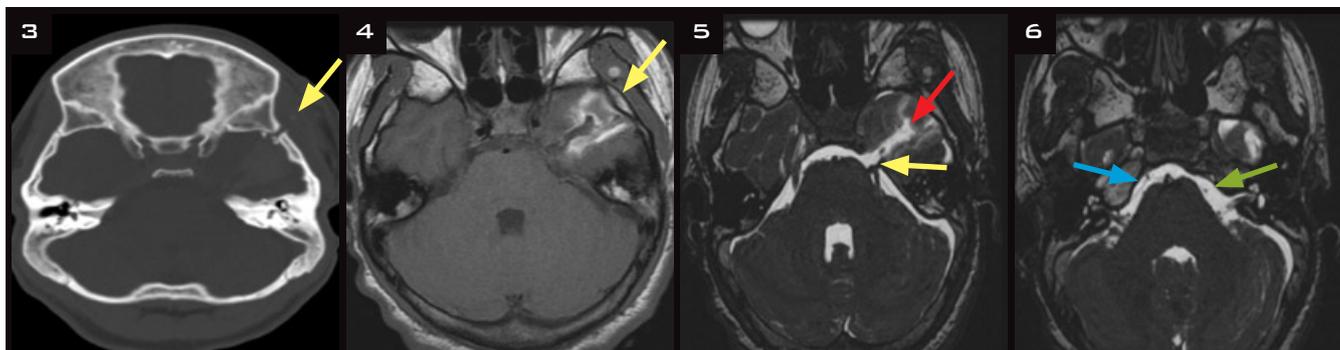
Extraocular motility examination revealed an esodeviation of his left eye in primary position and complete inability to abduct that eye (Fig. 2). All other eye movements were intact. He reported marked decreased sensation to light touch in the left V1 and V2 distributions and a lesser decrease in the V3 distribution. He couldn't furrow his left brow, but orbicularis oculi and lower facial function were intact. He had decreased left corneal sensation. The slit-lamp exam revealed an inferior punctate epithelial staining pattern in the left eye. Trace conjunctival injection was apparent in that eye. We noted no other motor or sensory deficits.

Differential diagnosis. When abducens nerve palsy is the main presenting symptom, the differential diagnosis revolves around vascular problems, inflammatory diseases and tumors. Traumatic abducens paresis is less common, but given Mr. Brown's

What's Your Diagnosis?



WE GET A LOOK. The patient sustained a superficial wound (1), but that was only the start of his problems. We noted esodeviation of his left eye in primary position and complete inability to abduct that eye (2).



FURTHER WORKUP. CT reveals key clues (3). On MRI, the T-1 (4) and T-2 (5,6) weighted imaging firm up the diagnosis.

history, our differential included a brainstem lesion (such as diffuse parenchymal axonal injury), peripheral nerve injury (with or without basilar skull fracture), lateral rectus muscle injury or entrapment and penetrating head trauma with transection of the abducens nerve.¹

The next step in the investigation of this case was neuroimaging.

Further Workup

We ordered a head CT (Fig. 3), which revealed soft tissue swelling in the left temporal area, a fracture of the squamosal temporal bone and a track of abnormal soft tissue density in the temporal lobe, along the left temporal-clival axis (arrow).

A T1-weighted axial noncontrast MRI image (Fig. 4) demonstrated subacute hemorrhage in the left temporal lobe along the temporal-clival axis (arrow) coinciding with the CT images.

A T2-weighted high-resolution axial image (Fig. 5) at the level of Meckel's cave showed the wound tract through the left temporal lobe (red arrow), as well as derangement of the fifth nerve in the prepontine cistern (yellow arrow).

A T2-weighted high-resolution axial image (Fig. 6) at the level of the pons showed the right sixth nerve in the prepontine cistern (blue arrow). The right sixth nerve was easily identified exiting the pontomedullary junction and coursing upward through the cistern at multiple scan levels. The image also was notable for absence of the left sixth nerve at its expected location in the prepontine cistern at the left pontomedullary junction (green arrow).

Discussion

Given the clinical and radiological evidence, it appeared Mr. Brown had suffered a penetrating skull injury through the temporal bone all the way to the level of the brainstem. We suspect this was inflicted by an object such as an ice pick. His multiple neurological deficits can be explained by traumatic injury to the temporal branch of the left seventh nerve, impaired fifth nerve function secondary to prepontine injury and apparent transection of the left abducens nerve.

Causes. The causes² of sixth nerve injury are legion and occur all along its course. A small number of sixth nerve pareses remain idiopathic but some common causes of damage include:

- **Vascular problems**—Microinfarcts of the sixth nerve tend to occur in older patients with microvascular disease, such as hypertension and diabetes, and are the most common cause of sixth nerve palsy. Rarely, aneurysms, particularly of the intracavernous carotid artery, can affect the sixth nerve.
- **Inflammation/infection**—meningitic processes of all sorts can affect the cranial nerves as they travel in the subarachnoid space. Some infections, including viruses and Lyme disease, can affect the cranial nerves directly. Similarly, inflammatory disorders such as sarcoid and MS can affect the sixth nerve. Owing to its close relationship with the petrous temporal bone, the abducens nerve can be involved in middle ear infections with associated osteomyelitis.
- **Increased intracranial pressure**—sixth nerve paresis probably results from stretching of the nerve as it

crosses the petrous ridge.

- **Trauma**—traumatic abducens nerve palsy can result, as in our case, from direct injury by a penetrating object. More often, it results from indirect damage, with or without skull fracture. The mechanisms of indirect damage are rarely clear, but could include compression of the nerve by hematoma or edema, stretching of the nerve, or vasospasm.

This was an unusual case. Our patient had traumatic injury to the abducens nerve. Although not rare, most cases are a result of closed-head injury. In the literature, case reports of abducens transection revealed only a few cases of incidental injury during tumor resection or cerebrovascular repair. In our case, Mr. Brown did not recall the facts of the incident and thus could not provide a history to assist in our clinical diagnosis. Clinical evidence, multiple thin-section MRI technique and knowledge of the cranial nerve anatomy proved important in arriving at the correct diagnosis.

* Patient name is fictitious.

1 Kim, M. S. et al. *J Korean Neurosurg Soc* 2008;44:396–398.

2 Wilson-Pauwels, L. et al. *Cranial Nerves: Anatomy and Clinical Comments* (Toronto: B.C. Decker Inc, 1988).

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